WHAT IS CLAIMED IS:

1. A mid-infrared light source, comprising:

a combiner coupled to at least a first pump laser and a second pump laser, the combiner operable to couple a first optical signal generated by the first pump laser and a second optical signal generated by the second pump laser to a gain fiber, the gain fiber comprising a first waveguide structure; and

a Raman wavelength shifter coupled to the gain fiber, at least a portion of the Raman wavelength shifter comprising a second waveguide structure capable of wavelength shifting at least one wavelength of the first optical signal to a longer signal wavelength.

2. The mid-infrared light source of Claim 1, wherein the first pump laser is selected from the group consisting of a continuous wave laser and a pulsed laser.

3. The mid-infrared light source of Claim 1, wherein the first pump laser is selected from the group consisting of a solid state laser, a Nd:YAG laser, a Nd:YLF laser, laser diodes, a semiconductor laser, and a cladding pump fiber laser.

4. The mid-infrared light source of Claim 1, wherein the second pump laser is selected from the group consisting of a continuous wave laser and a pulsed laser.

5. The mid-infrared light source of Claim 1, wherein the second pump laser is selected from the group consisting of a solid state laser, a Nd:YAG laser, a

Nd:YLF laser, laser diodes, a semiconductor laser, and a cladding pump fiber laser.

6. The mid-infrared light source of Claim 1, wherein the second pump laser comprises a plurality of laser diodes capable of generating a plurality of pump signals substantially centered on a selected wavelength.

7. The mid-infrared light source of Claim 6, wherein the second pump laser further comprises a multiplexer capable of combining the plurality of pump signals into the second optical signal.

8. The mid-infrared light source of Claim 7, wherein the multiplexer is selected from the group consisting of a wavelength division multiplexer, a polarization multiplexer, and a power combiner.

9. The mid-infrared light source of Claim 1, wherein the second optical signal comprises a selected wavelength selected from the group consisting of 980 nm, 1310 nm, 1390 nm, 1400-1499 nm, and 1510 nm.

10. The mid-infrared light source of Claim 1, wherein the longer optical signal wavelength comprises a pulsed optical signal having a pulse repetition rate in the range of two (2) hertz to one hundred (100) megahertz.

11. The mid-infrared light source of Claim 1, wherein the longer optical signal wavelength comprises a

pulsed optical signal having a pulse width in the range of two (2) nanoseconds to one hundred (100) milliseconds.

12. The mid-infrared light source of Claim 1, wherein a variation of the wavelength of the first optical signal causes a variation in wavelength of the longer optical signal.

13. The mid-infrared light source of Claim 1, wherein the combiner is selected from the group consisting of a wavelength division multiplexer and a power coupler.

14. The mid-infrared light source of Claim 1, wherein the gain fiber is selected from the group consisting of a dispersion compensating fiber, a dispersion shifted fiber, a single mode fiber, a chalcogenide fiber, and a fused silica optical fiber.

15. The mid-infrared light source of Claim 1, wherein at least a portion of the first waveguide structure is selected from the group consisting of an optical fiber, a hollow tube waveguide, an air core waveguide, and a planar waveguide.

16. The mid-infrared light source of Claim 1, wherein the first waveguide structure at least partially contributes to increasing an optical energy of at least the first optical signal and wherein the increased optical signal energy is communicated from the first waveguide structure at a selected wavelength.

17. The mid-infrared light source of Claim 1, wherein at least a portion of the second waveguide structure is selected from the group consisting of an optical fiber, a hollow tube waveguide, an air core waveguide, and a planar waveguide.

18. The mid-infrared light source of Claim 1, wherein at least a portion of the second waveguide structure comprises an optical fiber.

19. The mid-infrared light source of Claim 18, wherein the optical fiber comprises a mid-infrared optical fiber.

20. The mid-infrared light source of Claim 18, wherein the optical fiber is selected from the group consisting of a chalcogenide fiber and a ZBLAN fiber.

21. The mid-infrared light source of Claim 1, wherein at least a portion of the second waveguide structure is selected from the group consisting of a ZBLAN waveguide, a sulfide waveguide, a selenide waveguide, and a telluride waveguide.

22. The mid-infrared light source of Claim 1, wherein at least a portion of the second waveguide structure comprises a single mode optical fiber.

23. The mid-infrared light source of Claim 1, wherein the longer optical signal wavelength comprises a wavelength of approximately 1.7 microns or more.

24. The mid-infrared light source of Claim 1, wherein the longer optical signal wavelength comprises a wavelength in the range of two (2) microns to ten (10) microns.

25. The mid-infrared light source of Claim 1, wherein the longer optical signal wavelength comprises a wavelength in the range of five (5) microns to seven (7) microns.

26. The mid-infrared light source of Claim 1, further comprising a wavelength separator coupled to the Raman wavelength shifter and capable of transmitting at least a portion of a selected wavelength from the Raman wavelength shifter.

27. The mid-infrared light source of Claim 26, wherein the wavelength separator is selected from the group consisting of a demultiplexer, one or more partially transmissive gratings, one or more partially transmitting mirrors, one or more Fabry Perot filters and one or more dielectric gratings.

28. The mid-infrared light source of Claim 1, further comprising at least a third waveguide structure coupled to the Raman wavelength shifter, wherein the third waveguide structure comprises a coupling loss of no more than five (5) decibels.

29. A method of shifting an optical signal wavelength to a longer optical signal wavelength, comprising:

coupling a first optical signal generated by a first pump laser and a second optical signal generated by a second pump laser to a gain fiber, the gain fiber comprising a first waveguide structure; and

shifting at least one wavelength of the first optical signal to a longer signal wavelength using a second waveguide structure coupled to the gain fiber.

30. The method of Claim 29, wherein the second pump laser comprises a plurality of laser diodes capable of generating a plurality of pump signals substantially centered on a selected wavelength.

31. The method of Claim 30, wherein the second pump laser further comprises a multiplexer capable of combining the plurality of pump signals into the second optical signal.

32. The method of Claim 29, wherein the second optical signal comprises a selected wavelength selected from the group consisting of 980 nm, 1310 nm, 1390 nm, 1400-1499 nm and 1510 nm.

33. The method of Claim 29, wherein the longer optical signal wavelength comprises a pulsed optical signal having a pulse repetition rate in the range of two (2) hertz to one hundred (100) megahertz.

34. The method of Claim 29, wherein the longer optical signal wavelength comprises a pulsed optical signal having a pulse width in the range of two (2) nanoseconds to one hundred (100) milliseconds.

35. The method of Claim 29, wherein a variation of the wavelength of the first optical signal causes a variation in wavelength of the longer optical signal.

36. The method of Claim 29, wherein the first waveguide structure at least partially contributes to increasing an optical energy of at least the first optical signal and wherein the increased optical signal energy is communicated from the first waveguide structure at a selected wavelength.

37. The method of Claim 29, wherein the longer optical signal wavelength comprises a wavelength of approximately 1.7 microns or more.

38. The method of Claim 29, wherein the longer optical signal wavelength comprises a wavelength in the range of two (2) microns to ten (10) microns.

39. The method of Claim 29, further comprising transmitting at least a portion of a selected wavelength from the Raman wavelength shifter into a third waveguide structure.

40. A mid-infrared light source, comprising:

a gain fiber operable to receive at least a first optical signal comprising one or more wavelengths, the gain fiber comprising a first waveguide structure; and

a second waveguide structure coupled to the gain fiber and operable to wavelength shift at least one wavelength of the first optical signal to a longer wavelength optical signal, the longer wavelength optical signal comprising a wavelength in the range of two (2) microns to ten (10) microns.

41. The mid-infrared light source of Claim 40, wherein at least one wavelength of the first optical signal is selected from the group consisting of 980 nm, 1310 nm, 1390 nm, 1400-1499 nm and 1510 nm.

42. The mid-infrared light source of Claim 40, wherein the longer wavelength optical signal comprises a pulsed optical signal having a pulse repetition rate in the range of two (2) hertz to one hundred (100) megahertz.

43. The mid-infrared light source of Claim 40, wherein the longer wavelength optical signal comprises a pulsed optical signal having a pulse width in the range of two (2) nanoseconds to one hundred (100) milliseconds.

44. The mid-infrared light source of Claim 40, wherein the first waveguide structure at least partially contributes to increasing an optical energy of at least one wavelength of the first optical signal and wherein

the increased optical signal energy is communicated from the first waveguide structure at a selected wavelength.

45. The mid-infrared light source of Claim 40, wherein the longer wavelength optical signal comprises a wavelength in the range of five (5) microns to seven (7) microns.